

SIGMA XI QUARTERLY

Vol. XIV

DECEMBER, 1926

No. 4



EDUCATIONAL NUMBER

Wickenden on "The Investigation of
Engineering Education"

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*Published by the Society of the Sigma Xi
at Easton, Pa.*

ANNUAL SUBSCRIPTION \$1.00 SINGLE NUMBER 25 CENTS

Changes of address should be communicated only to chapter secretaries.

Subscriptions and manuscripts should be sent to the general secretary, Edward Ellery, Union College, Schenectady, N. Y.

Entered as Second-class Matter, June 8, 1923, at the Post Office at Easton, Pa., under the Act of August 24, 1912. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized June 8, 1923.

SIGMA XI QUARTERLY

EDITORIAL COMMITTEE

FLOYD KARKER RICHTMYER
EDWIN EMERY SLOSSON

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EDWARD ELLERY

VOL. XIV

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EDITORIAL COMMENTS

At its October (1926) Meeting in New York, the Executive Committee had as its luncheon guest Mr. William E. Wickenden, Director of Investigation for the Society for the Promotion of Engineering Education. Mr. Wickenden's informal conversation at the time regarding the result of his investigations, as far as he has worked them up, was so full of interest and of such real value to all of us who are associated with educational work, whatever our field, we asked him if he would make a similar report to the five thousand and more enrolled members of Sigma Xi. We are privileged to present to our membership in this number a paper especially prepared for us. All of us appreciate deeply Mr. Wickenden's generous favor. The cause of education in general will be profoundly affected as Sigma Xi men and women in our forty-five chapters have in this contribution to the Quarterly direct information of a broad field of investigation.

* * * * *

In the September Quarterly we called attention to the pamphlet issued by the University of North Carolina in which is set forth the research in progress at that institution during 1925-26, and asked that similar reports from other universities and colleges where there are chapters of Sigma Xi be sent to the secretary. In response to that request the Secretary's office is in receipt of a bulletin published in January, 1926, entitled, "Research in Progress at the University of Minnesota, July, 1924-July, 1925." The contents were compiled by Prof. Clarence M. Jackson, Director of the Department of Anatomy at the university. The bulletin comprises 293 pages and an index, gives under the name of each investigator the title of

the research and a brief abstract, and includes investigations in progress at twelve colleges and schools of the University.

The Secretary repeats his request. May he not have in his office all the time an up-to-date and complete report of research in progress at each one of the 44 institutions in which there are chapters of Sigma Xi?

A LETTER FROM SIR ERNEST RUTHERFORD

The Fellowship Committee, through its chairman, Dr. Willis R. Whitney, recommended to the Executive Committee that an award of \$1000 be made to Sir Ernest Rutherford of the Cavendish Laboratory, at the University of Cambridge. A poll by mail was taken, and there was unanimous and enthusiastic consent to the grant on the grounds of the quality and constant output of the research work at that laboratory and of the cordial welcome and helpfulness extended to American students there by Sir Joseph Thomson, Sir Ernest Rutherford and their colleagues. In accordance with this recommendation of the Fellowship Committee and the vote of the Executive Committee, Dean Pegram, treasurer of the society, transmitted to Sir Ernest the society's check for \$1000. Just as we go to press the following letter is received by the secretary, which he is privileged to pass on to our entire membership. Sigma Xi has added one more point of contact to the others already existing between investigators in England and the United States, and one more influence toward keeping these two great nations together. The whole world is convinced that upon the continued cooperation of Great Britain and the United States depends the advance of civilization along all lines.

Sir Ernest's letter is as follows:

Cavendish Laboratory, Cambridge
December 10, 1926

DEAR DEAN ELLERY:

I was very surprised and I must confess very gratified to receive your letter in which you inform me that the Society of Sigma Xi had awarded me a grant of 1000 dollars to assist my researches. Quite apart from the actual magnitude of this generous contribution, I very much appreciate your expressions of good will and interest in the work of the Laboratory which I have the honour to direct. I have not yet had time to decide in what way I will use your contribution but will inform you in due course.

I am very interested to hear from you, and from the enclosed pamphlets, the activities of your Society. It always seems to me that Americans have a great advantage over us in the way they pull together enthusiastically for a good cause. We have just finished

our term, a very heavy one, research students are thicker than ever. On Dec. 18th we hold a big Cavendish Dinner in celebration of J. J. Thomson's 70th birthday, and make him a presentation, etc. We are expecting a big roll up of research students. I have, of course, been extremely busy this year as President of the Royal Society but I have breathing space now for a month or so.

Everyone you mention in the laboratory is well and working away as usual. Thank you for sending me a copy of your address on Educational Condition in England, which I have read with much interest and appreciation.

With best wishes

Yours sincerely,
(Signed) E. RUTHERFORD

A MODEL FOR CHAPTER OFFICERS

There are a few chapters which are in constant touch with the secretary, and through him with the other national officers, by direct correspondence covering many points of national policy and chapter activities. The executive committee wishes such contacts might be more frequent and more extensive, that the secretary's office might be deluged with questions and letter-conferences regarding the purposes of our great society, the ways of meeting them, plans for future expansion, etc.

As a brilliant example of such correspondence, and also as exhibiting a model chapter president, we are permitted to present this letter from Dr. Livingston, whom everyone knows as the permanent secretary of the American Association for the Advancement of Science, and whom we are happy to present to our membership as the president of the Johns Hopkins Chapter.—E. E.

Laboratory of Plant Physiology
The Johns Hopkins University, Homewood,
Baltimore, Maryland
December 7, 1926

Dr. Edward Ellery
Union College
Schenectady, New York

DEAR DOCTOR ELLERY:

They made me president of the Hopkins chapter of Sigma Xi last spring and it seems to be up to me to know something about the organization—which I don't now. One of the things I wish to do to improve this chapter is to prepare a little paper or speech which can be used in introducing new members at the initiation time. Our secretary doesn't seem to have much information to use as thunder for such a purpose and I am coming to you to ask for help, all you can give. I don't know enough to know what to ask for, but you will realize what I need. Points of the history and development of the organization, the meaning of the Greek letters and the translation of the words, the story of the curious way the letters got selected, names of people that had to do with organizing the Society, list of all chapters with letters and dates of organization, number of active members,

number of alumni members, amount of the fellowship fund, number of members contributing to it, manner of election of fellows, names of past and present fellows and their lines of work—these and others are some of the things I think every member—and especially every president—ought to know. I imagine you have all this sort of material in handy form and can send it to me without any trouble. Anyhow, I need it a lot and I'd like to have all you can supply. It seems to me the founders of our chapter should have collected this sort of material and started the archives of the chapter at the beginning. It's a little late, but if you'll help me I'll fix it all up in good form and it will be here awaiting the next president of this chapter, also for any member who happens to be interested. I don't see how we can hope to get much of a drag in a place like this unless we can tell each new member a lot of interesting things about the Society.

I have got our secretary a-going and he is enthusiastic about getting rollers under our chapter to make it begin to roll as a Hopkins science society should. We shall soon have a directory of our active members and before long one of all our members, and we are going to mimeograph or multigraph or print the thing and give one to every member. I think that will help—people like to see their names in print, you know. If we begin early and organize our machinery we can always have this up to date. I've got the A. A. S. machinery arranged now so that all who have been members since Woodley and I took hold are properly listed and all their dates shown. Maybe if we do this for the Hopkins chapter we can get other chapters to do similar things and that would greatly help your office.

Oh, yes, I meant to ask you to tell me as much as I may know about the use made of the chapter's contributions to the general organization. There seems to be a lack of knowledge about this, which is very interesting to members. Do you ever publish reports? If so, I'd like to have some of the recent ones for study.

.....

I think there are a good many possibilities for great things for the Society here and I'm going to make a good try to realize them. Please forgive me if I bother you a bit for information. If you have to spend more money on clerical work for me than is legitimate, I'll be glad to pay costs. Please don't let that feature get in the way.

I don't know about constitution, etc., though perhaps a copy came to Doctor Pullen. Is this published from time to time? I think it would be nice to put it in the hands of all active members and keep

them up to date. I asked Doctor Pullen what the proposed amendment on alumni associates might mean and he didn't seem to be informed. The other proposed amendment seems plain on its face.

Are there any by-laws or such, which are not in the constitution as it will come to me? We want to operate constitutionally and in accord with the general organization in every detail. The more I know the better we can do our job.

How about having meetings open to outsiders? Is it allowable from the standpoint of your office? I have the thought that some chapter meetings might be wide open and some might be open to members and associates only, while others might be open to members and associates and friends whom they bring. What do you think of such a plan?

Yours very sincerely,

(Signed) BURTON E. LIVINGSTON,
Director, Laboratory of Plant Physiology

HONOR SOCIETY CONFERENCE

At a meeting of the Executive Committee held in New York in May, 1925, the committee had as its luncheon guests Dr. Oscar M. Voorhees, secretary of Phi Beta Kappa, and Dr. William W. Root, secretary of Alpha Omega Alpha, the honorary medical society. These gentlemen suggested at the time the possibility of organizing an Honorary Society Conference, and our executive committee indicated its interest and expressed willingness to consider with representatives of other honorary societies the feasibility of effecting such an organization. A tentative conference of representatives of a half dozen such societies was held in October of the same year, and at Kansas City in December, 1925, a temporary organization was formed, with the following named as officers: President, Dr. Francis W. Shepardson; Directors, Henry B. Ward, William W. Root, Arthur D. Moore, Floyd K. Lichtmyer and Oscar M. Voorhees.

During the Sesqui-Centennial of Phi Beta Kappa at Williamsburg, November 27-29 last, a permanent organization was perfected, officered as follows: President, Dr. Francis W. Shepardson; Vice-President, Dean Edward Ellery; Secretary-Treasurer, Dr. William W. Root.

Certain definite actions were taken by the representatives who were present, regarding the policy of the new body, chief among them being the following:

1. Membership; organization at present to be limited to the following honorary societies; Phi Beta Kappa, Sigma Xi, Tau Beta Pi, Order of the Coif, Phi Kappa Phi, Alpha Omega Alpha.
2. Annual dues to be \$50.

The secretary of Sigma Xi was not present, since at the time of the meeting he was making an official survey of an institution, a group in which may possibly in the near future petition the convention for a chapter of Sigma Xi.

Among those at the conference was the former secretary and ex-president of our society. There is no living member of Sigma Xi better acquainted with its history and purposes "from its youth up" than Professor Ward. We present to our membership excerpts from his report of the meeting at Williamsburg.

"It was really a significant occasion, and when I saw the way in which various other organizations were represented I was exceed-

ingly glad that Sigma Xi had its official representative. I presume that you have received a copy of the program of the day giving the list of events and also the names of representatives. In most cases both the honor societies and the social fraternities were represented by men of outstanding reputation. In fact, the academic procession included a list of the most representative people that I happen to have seen together on any single occasion of this size, so that it was both a privilege and an honor to be included in the group. I need not, however, discuss that point further, since my preliminary purpose in writing was to speak of the conference of honor societies."

"It was evident from the start that the movement had much greater significance than I had appreciated. When Dr. Shephardson called the conference to order there were present half a dozen representatives. It appeared that the small attendance was intentionally provided for, and the opening remarks of the chairman, which were very strongly supported by the further comments of Dr. Voorhees, opened up an aspect of the question that had never fully impressed me before. I do not know how well you know Shephardson, but I regard him as one of the outstanding men in breadth of vision and grasp of general educational relations, especially those that concern such organizations as the social fraternities and other groups, that, though in a sense outside, are exercising a very real and intimate influence on the educational policy in the development of our institutions. He had evidently studied this question carefully and had reached very clear convictions. I felt that his conclusions were thoroughly justified."

"It would be impractical to go into the thing in much detail, but he outlined that situation, calling attention to the large number of honor and honorary societies and the rapid increase in that number within very recent times. He gave evidence to show that the significance of such organizations had been obscured by the multitude that had entered the field and the influence they exercised had been unfortunately dissipated in the public mind and also to some extent in college circles by the very multitude of them and the failure to differentiate between claims and achievements. He feels that it is essential for the sake of education to differentiate in some way between the ephemeral and the casual organization on the one hand and those which stand for definite ideals on the other. He developed this thesis by a wealth of examples, and I could out of my own experience supplement his showing by various other instances."

"Coming back to the practical side, it seems to me that in a movement led by men of his type and supported powerfully by Dr. Voorhees, Sigma Xi certainly must be interested in active fashion. I was much delighted that the proposal to make our secretary vice-president met with prompt and hearty response, for I believe that he can do significant work in helping to organize this movement and shape standards which will mean much in the future for the development of the real honor societies. Sigma Xi certainly ought to take this position right alongside of Phi Beta Kappa in a dignified movement to emphasize real values and prevent either the public or the uninformed student body from being misled by other movements that are similar in form or name only. In this connection, Shephardson's article in Banta's Greek Exchange for January, 1926, page 16, is worth reading. He is going to follow up our conference and is in position to give public expression to its discussions in a way that will be very influential."

THE INVESTIGATION OF ENGINEERING EDUCATION

W. E. WICKENDEN, Director of Investigation

Society for the Promotion of Engineering Education

A new chapter in the history of educational inquiry has been written during the past three years by the Society for the Promotion of Engineering Education. With financial support from the Carnegie Corporation, this Society has enlisted the participation of more than one hundred and thirty of the engineering colleges of the United States and Canada, together with the U. S. Bureau of Education, the national engineering societies and the industries, in a concerted group of investigations. As a sequel it is now organizing a co-operative movement to put the results of these studies into effect. The cooperative method has achieved two equally important ends: it has greatly augmented the body of factual evidence and it has created a widespread attitude of receptivity toward the findings. The momentum gained in the processes of inquiry is now being conserved in efforts to gain tangible results.

It is not intended to summarize here the great volume of evidence which has been assembled, bearing on the curricula, the personnel problems, the industrial services and the professional relations of the engineering colleges. This is being published in a series of Bulletins and discussed in a series of Reports which will be given a wide circulation and may be consulted for information in detail. It will suffice, perhaps, to outline the more general conclusions arrived at and some of the lines of development being recommended.

First, let us consider the inevitable question of standardization. The "one best way" in engineering education may exist in the abstract, but no single plan is best in the concrete. Engineering is neither a single, characteristic type of activity nor a sharply defined professional status. The colleges necessarily stress diverse aims as they serve dissimilar constituencies. Highly restricted admission may be best at California Tech. and indefensible in North Dakota. Individualism in personnel matters may be best at Harvard and paternalism best at Purdue. Fifteen or twenty distinct curricula may be best at Massachusetts Institute and a single curriculum best at Stevens Institute. A six-year arts-engineering program may be

best at Columbia and unwarranted at Syracuse. Uncompromising intellectuality may be best at Hopkins and vigorous practicality best at Pratt. The cooperative plan may be best for Cincinnati and inadvisable for Case. Any effort to make the engineering colleges as much alike as the medical colleges would deserve to fail. Progress cannot be sought through imposed standardization but rather through the freedom and initiative of individual colleges; it can be stimulated, however, by giving the college a sense of participation in a general betterment movement.

Second, what of the persistence of the engineering school as a type of undergraduate college? It is plain that adequate engineering education cannot be anything less than sound general education if engineers are to utilize efficiently the forces, materials and energy of nature, to organize effectively the human effort associated with these efforts, to appraise rightly the resulting costs and values in both monetary and social terms, and to discharge the broader obligations to society which are incumbent on a professional group. The question is not one between cultural and technical education, but between providing the two in segregated programs or in an integral program. Engineers everywhere are insisting upon a more generous provision for the humanistic side of education, particularly through added emphasis to English and the social sciences, but the weight of their opinion favors an integral program in which the humanistic, the scientific and the technical elements are developed side by side and opposes any such sharp segregation of pre-professional and professional stages as prevails in legal and medical education. In short, engineering educators aim to develop a distinctive and robust form of undergraduate education, possessing large general values, and a worthy alternative to the liberal arts.

Third, what of the soundness of the educational processes and standards? The evidence largely supports the stand that the great body of engineering education is sound in essentials, but that much of it needs to be saved from an excess of its virtues. Certain distinctive merits deserve recognition, chiefly definiteness of aim, good student morale and a curriculum which is thoroughly coherent, selecting its elements from a wide range of knowledge and bringing them to a focus in a definite area of interest and effort. While engineering education is in little danger from shoddy, there is real danger that the best of it may lack distinction. There is a tendency in some quarters to make of engineering education a most effective

form of training for highly industrious, but essentially routine and mediocre students. As matters now stand, the average requirements of the engineering colleges approach quite close to one hundred and fifty semester-hours, virtually five normal academic years to be crowded into four. The maximum is practically two hundred credit hours. The effort to cover this volume of work in four years had led to methods of educational management for the raising of output not unlike the industrial prototype. The result is a task system of education, with work materials elaborately organized, with work requirements broken down into a sequence of small-dimensioned concrete work units, with day-to-day work assignments, and with output inspected continuously and in detail. As training for the mediocre the process is a marked success, but it favors sheer industriousness rather than initiative and resourcefulness and fails to discriminate between the super-plugger and the man of original gifts.

While a reduction of maximum requirements and some change in the regime of work is being encouraged, there is little prospect that engineering curricula will lose their position as the most arduous of undergraduate programs. A strict regime is apparently a necessity in the early years of college work, but students should progressively be weaned away from spoon-feeding methods in this period and prepared for a much larger measure of self-direction as upper classmen. Selective sectioning of the large groups pursuing the common introductory subjects would facilitate the approach to individual treatment warranted at this stage. The plan of work favored for upper classmen involves appreciably less paternalism, marked by less strict control of attendance, larger scale work assignments, less dependence on artificially consolidated sources, the introduction of some tutorial teaching and the use of more comprehensive measures of achievement, culminating in some type of comprehensive examination. In addition to these measures for the majority, the introduction of the highly autonomous plan largely known as the "honors" course is being suggested for highly selected men in the upper years.

Fourth, is specialization being encouraged? Whatever their original intention, a majority of engineering students actually put their college training only to the uses of a general education centering on engineering principles and methods. The minority which enters upon activities which make a heavy demand on the specialized technique of engineering are apt to discover their specialized needs only after a period of orientation and experience. Undergraduate special-

ization always runs the risk of being misdirected. The range of specialization in engineering technique is now so extensive that any effort to find a place in college curricula for all of it would lead either to extreme superficiality or extreme diversification of programs. All these considerations give impetus to the trend away from specialization for undergraduates.

As specialization for undergraduates is diminished there may be expected a corresponding increase in facilities for specialized training after graduation. Only a minority may be expected to continue their studies into specialized realms, either continuously or after a short break, through post-graduate university work. If the majority are to be served at all, opportunities for advanced specialized training must be brought to the man without interrupting his work. An extensive scheme of post-scholastic education using extension methods is being proposed to meet this need and may be expected to develop rapidly from rudiments now existing.

The true justification for a variety of engineering curricula is to be sought in terms of educational efficiency rather than the pursuit of specialization. Engineering teachers and practitioners alike favor only enough differentiation between the several curricula to assure to each a logically related body of subject matter and to gain the cumulative effect of concentration toward the end of the course. Basic curricula in civil, mining and metallurgical, mechanical, electrical and chemical engineering, with supplementary group options in the principal divisions of these fields for the senior year, appear to afford ample diversity for all but exceptional cases and to conserve the incidental advantages of the present contacts between the colleges and the organized activities of the profession. A common freshman year and a largely differentiated senior year are advised as a general practice, with a moderate degree of differentiation in the intervening period.

Fifth, should there be a shift of emphasis from applied science toward management? It is plain that engineers are increasingly concerned with problems of administration and that a majority of the graduates sooner or later find their primary responsibilities in this realm. It does not follow, however, that it would be a gain to shift the center of gravity in engineering education from applied science toward direct training in managerial technique. Larger attention to economics is desirable, together with a closer bond between that subject and the engineering features of the curriculum.

Much more stress on considerations of engineering economy seems warranted in many of the engineering subjects proper. The social backgrounds of many managerial problems should be approached through suitable humanistic studies, but the study of managerial technique as such should be a complement and not an alternative to an extended grounding in the sciences, economics, and the physical basis of engineering. It is preferable, therefore, that specific attention to administration and management should take the form of one of the senior group options in each of the engineering curricula proper, with ample provision for continuing the study of management after graduation, rather than the form of a distinct undergraduate course of study.

To assure an adequate humanistic grounding and to preserve the essential centering of engineering curricula in the realm of applied science a common core of subject matter has been marked out which may properly claim about two-thirds of the total time allotment. Included in this common core are mathematics, English, physics, chemistry, graphics, economics, mechanics, hydraulics, heat power and an introduction to electrical engineering. It is advised that cultural studies should be required in all years of the curriculum, with considerable range of election beyond the prescribed work in English and economics.

Sixth, should admissions be more selective? The personnel problems of the engineering colleges tend to assume an aggravated form due to the severity of the curriculum and the demands made on distinctive type of aptitude and interest. The most striking index is the high elimination ratio, exceeding sixty per cent in the average institution. The causes of elimination have been examined in some detail and are found to be about half scholastic and half personal. Two-thirds of the scholastic failures are to be traced to lack of ability, lack of interest and faulty preparation. It is not to be expected that the graduation requirements of a highly popularized form of secondary education will discriminate between grades of ability and types of aptitude to a very significant degree. Indiscriminate admission on certificate will probably give way to a more selective process, based on a superior academic record in essential subjects and an inventory of mental and occupational aptitudes. The colleges are being stimulated to undertake the study and experimentation needed to make selective admission fair and effective. Meanwhile the same ends are to be sought by advisory measures, directed

alike to the prospective student, his parents and other adult advisors. The engineering colleges are already taking steps to make their distinctive contribution to educational guidance and are preparing special publications for the purpose.

If selective admission is to be a constructive and not merely a restrictive measure it is essential that alternative educational opportunities should be made available. The work of an engineering college is, or at least should be, dominantly scientific and incidentally technical. As an alternative there is a definite need for a type of education which is dominantly technical and only incidentally scientific. Some of the colleges are suffering from confusion of aims and methods which grow out of the lack of distinctive schools and courses of the more strictly technical type. Lack of such training is leading to much misdirected recruiting in industry. Many young men who fall by the wayside in an engineering college from misdirected interest or failure of incentive in the face of extended theoretical requirements, rather than lack of intrinsic ability, might succeed creditably in such an alternative program. In short, there is needed a briefer, less expensive, but equally thorough type of technical training, with theoretical features subordinated to the aim of making the student an effective producer in technical and supervisory duties of a less specific nature than skilled craftsmanship. There is need for expansion in technological education, if our youth are to be served and the needs of industry supplied, but far the greater part of it ought to be in the form of more intensive training processes rather than a multiplication of engineering colleges or a large addition to their enrolments.

A partial solution of the problems of admission and elimination may be found by establishing an intermediate goal at the end of two years and by leaving the question of eligibility for further study in engineering to be determined at that stage. This plan is equivalent to shifting the more serious part of the selective process to mid-course, where the college may deal with it under its own control and on a basis of first-hand evidence and with the alternative of granting a certificate of honorable dismissal which would permit a transfer to some other educational program and the privilege of admission to the upper stage of engineering studies.

Finally, what of the engineering teacher? Here we touch upon the outstanding problem of engineering education. The trend of recent years, as a whole, has tended to increase the disparity between

the inducements of practice and those of teaching, as measured by opportunities for leadership, distinction and compensation. While the demands made upon the colleges have increased, conditions have tended to make teaching relatively less attractive to men of notable gifts. On the other hand there is definite evidence that the tangible rewards and opportunities of teaching and of practice are practically identical for mediocre men, with intangibles tend to swing the balance in favor of teaching. The prevailing *laissez-faire* policy has led to the accumulation of earnest, faithful, but routine teachers and to failure to develop the more gifted men on a par with their equals in endowment in active life. A shortage of qualified men for first-line positions is at hand.

The remedy appears to lie in more positive modes of recruitment and development, together with a scale of compensation and economic protection, which parallel the practices of the more progressive of the stable industries.

If the engineering schools are to retain and magnify the status of undergraduate colleges it is essential that they give attention to the quality of the teaching processes. It is wholly unlikely that young men preparing for a teaching career in engineering will seek training in the art and science of teaching in an institution specialized to that end. Training must be brought to the man. The contributions of educational science must be brought to the engineering colleges. To be most effective, these efforts require the collaboration of teachers of engineer and professional educationists; they should be carried out on engineering premises and the results disseminated through engineering channels.

As an initial step it is proposed to organize and conduct special summer schools for engineering teachers under the common auspices of the engineering colleges. During the experimental stage this effort will probably be concentrated on one or two particular divisions of subject matter, such as physics and mechanics, which enter into all engineering curricula. Part of the effort will be devoted to the art of teaching the subject in its conventional aspects, and part to the exploration of its more extended aspects. It is proposed to deal with the problems of teaching through direct example, precept, assigned projects and tutorial conferences, and to supplement the more intensive side of the work with recreational and inspirational features. Once the method has been established experimentally, it may be expanded to include any or all of the widely taught subjects.

At the time of writing, the transition from the phase of investigation to the phase of application is in full swing. The colleges are appointing committees on educational policy to succeed committees of investigation. They are selecting experimental projects in educational method to succeed fact-finding activities. Joint projects are being set up with the national engineering societies, with representatives of the industries and with representatives of other divisions of education. This new phase of activity is being sponsored by the national engineering societies and financed with their assistance and that of the engineering industries.

THE EDUCATION THAT IS BRITISH

EDWARD ELLERY

The all-inclusive answer to the question, "How can the British undergraduate do all that he does with such a high degree of excellence?" is found in the education that is British. It is either the product or the producer of the character that is British, probably the former since people precede institutions, and institutions are an expression of the character and ideals of a people. A factor in British character is the power to concentrate on a present interest, a pressing situation, an insistent demand. What has passed is not forgotten, but is in the background, not the foreground, of national consciousness.

Contact with British people affords impressive illustrations of this national trait, illustrations which, while individual, are typical. In 1914, Great Britain had set her sturdy body and all her intelligence immovably in the way of the brutal onslaught on all that civilization had attained during preceding centuries of travail and struggle. The Britishers everywhere knew what the war meant even before the government was fairly launched in her effort to protect the world. In August of that year, Professor Adeney of the University of Dublin, with whom we had planned to spend part of a year, advised us not to come, "for," he wrote, "Great Britain has entered this struggle with her whole soul, resolved to use all her resources without reserve, and every Britisher inside and outside the universities will enter the service of the government. There won't be any university work until after the war is over." Here was the typical British concentration on the thing in hand.

Eight years after the armistice, the Britisher does not talk about the war, neither in Parliament nor in the universities nor in commercial gatherings nor in individual conversation. The war is a thing of the past. The Britisher has not forgotten, but it is not in his consciousness. New things are at hand to be done that are important and imperative. Those who were hardest hit by the war are the most reticent to talk about it. We know English families from which the war exacted one or two or three sons, but we learned of the great bereavement only by accident, never by complaint. The blow had struck deep into the life of these fathers and mothers—too deep for words, and too deep even to be kept in consciousness. There were other pressing things upon which to concentrate. The Christmas

sermon last year by the Master of the "Inner Temple Church" in London was spoken, we knew, from the authority that comes from an experience that had touched the sources of life. But conversation with the Master, and afterward with his family, did not bring out what that experience had been. It was only by an accident that we learned that three of his sons gave their lives to Great Britain and to the world in the great war.

The war is over, other things are at hand to be done, international and intranational. The Britisher is concentrating upon them. There is the League of Nations. Great Britain has set her heart to that. The Prime Minister, acting for Great Britain, bent every effort to bring Germany into the League and to membership in the League Council. In all the controversies about that among the nations of smaller calibre, narrower ideals and more selfish motives, Great Britain has been immovable for the admission into this society of nations of her former foe who had inflicted upon her untold and untalked-of losses. In all the discussions in Parliament and in press on this subject, expressions of bitterness and resentment and enmity were absent. The war is over. It has left deep scars on the souls of the British people. It is not forgotten, but it is not in the present national consciousness. Other things are pressing to be done.

This characteristic British attitude came again to expression during the general strike last May. There were two paramount stupidities in that strike, both on the part of the labor unions and their leaders. One was the stupidity in thinking that there could be such a thing as a general strike—a strike of all labor simultaneously. Every individual is too dependent upon the labor of every other individual to make a general strike possible, if existence is to be continued. A coal miner may strike independently. By so doing he brings suffering and inconvenience upon himself and his nation in one respect only. But if, at the same time, the railroad men strike, then the moving of commodities that are necessary for the coal miner and his family is obstructed. If, at the same time, tramway and bus drivers strike, then even the strikers must walk to the place they wish to go. If, at the same time, the clothing industry strikes, then none of the strikers can secure essential clothing. A general strike simply cannot be. That was stupidity number one.

Stupidity number two was that the Britisher of any class should for an instant think that the British government, founded on the character that is British, stable for hundreds of years against repeated and

titanic assaults from without and within, would be caught napping in a crisis or at any other time. From whatever angle the general strike is viewed, under the circumstances under which it was called (when Mr. Baldwin, representing the government, was negotiating with the miners and mine owners) it was aimed, whether consciously or unconsciously, at constitutional government. The intelligentsia of Great Britain recognized that at once. The labor leaders who called the strike in the first place acknowledged it when humbly admitting in the terms of agreement publicly printed over their signatures that they had made a mistake. There is the British national mind recognizing, acknowledging, grappling with a fact—concentrated on a problem. The general strike was an appeal to force, not to reason. The government applied force against force just as it did in the great war, but applied it with the utmost intelligence of which it is capable. It called for volunteers in order that mere living as well as some other things might go on. Of course, there was an immediate and adequate response. It is not at all surprising that the university undergraduates reported for work en masse, and it was part of the attitude and spirit that is genuinely and characteristically British that the undergraduates went into all kinds of occupation, concentrated for the time being on the thing in hand. There is nothing surprising in the statement made to us by a superintendent of docks in Southampton that the 1100 university students who for a week took the places of 1500 ordinary, uneducated, unskilled stevedores, were husky youngsters who handled as many tons of cargo in three hours as his regular crew handled in eight. Of course they could. It was wholesome physical power intelligently applied. In seventy-two hours the labor unions, or, more accurately, the labor leaders, learned anew what they had stupidly forgotten for the moment—namely, that sound thinking and sturdy bodies are typically British. They are expressed in the stability and solidity of British society and British government. The strike leaders came to Mr. Baldwin and employers like naughty boys, told the nation at large that they were sorry and took their spanking. (We are not referring here to the long-continued coal strike still being carried on at this writing. The issue in that conflict is very complicated; there are many sides to it.)

When the general strike was called off, the nation as a whole forgot it—at least, it was not retained in national consciousness. There were no recriminations, no charges and counter-charges, no "I-told-

you-so's'' on the part of Mr. Baldwin and his cabinet, no animosities. The nation concentrated upon the next thing—recovery from the upset; sincere effort to rehabilitate the foolish strikers. The undergraduates returned to their studies. They hardly talked about the general strike or their experiences. That was over. The next thing demanded and received exclusive attention.

This power to concentrate finds an expression in the British educational system. Authority to charter a degree-granting institution is vested in Parliament. Therefore, throughout British universities there is a marked uniformity of standards. Institutions may be, and are, individual in certain superficial characteristics—expenses, curricula, customs, social life, sports—but the method of instruction, the requirements for admission and for degrees, and the thoroughness and solidity of the intellectual life are fundamentally alike in all. Parliament does not view with favor weak degree-granting institutions. Not every organization with ambitions for degree-granting privileges will be recognized at once upon its asking for such privileges. Parliament exercises its authority slowly and cautiously. The University of London—now numbering 21 different institutions, each a corporate body with its own endowments and distinctive institutional life—was founded in 1829 as a sort of stock company with subscribed capital, and became a degree-granting institution in 1836. That was fairly quick procedure for a British Parliament. The University of Durham was chartered in 1909, or 38 years after the formation of its youngest component, namely, Armstrong College in Newcastle. The newest member of the education family joined the circle last spring—the University of Reading, which began its existence as a local college in 1892. Final educational authority in Great Britain is centralized, concentrated in Parliament.

When a young Britisher comes up to a university, he expects to be a university man exclusively with all that it implies of enthusiastic participation in the intellectual and much of the extra-curriculum life of the institution. Forgetting every other interest, even his family for the time being, he gives himself unreservedly and with concentration to being a university man. He has nothing to worry about. His scholastic preparation has been substantial and sufficient; he could not have passed his matriculation examinations if he had not been solidly prepared. He attacks his new tasks, involving new methods of study, with confidence and without anxiety. He knows that if he fails it will not be due to imperfect or improper

preparation. His living is provided for. He either holds an adequate scholarship won in competitive examination; or, in rare instances, he had command of funds provided by a County Council, because in his preparatory schools he had shown that he has brains or his family have supplied him with the necessary funds. The phenomenon of a student earning part or all of his expenses while a student is unknown. The undergraduate has no cause to worry about the adequacy either of his preparation or of his finances. He is free to concentrate on the thing in hand—namely, being a university man.

One notes this same attitude in the British undergraduate at his sports. Apparently he is not affected by a victory or a defeat. He wins or he loses, and immediately after the contest addresses himself to the next thing. It may be lectures, examinations, another game. The former things are passed; they are dismissed from consciousness.

Another illustration of this concentration which is a feature of the education that is British is afforded by the so-called "pass" and "honors" courses which, with some variations, are found in all the universities of Great Britain. It is sufficient to state in this article that the "pass" course is composed of a somewhat general curriculum. It includes an early examination in the Bible and in four other subjects, two of which must be languages other than English. The final examination is given at the end of the third year in a rather wide choice of subjects of which there must be three, one of them a language. In other words, for two years at least the undergraduate concentrates on three subjects.

The "honors" course is fundamentally different. The student chooses practically one subject, and his final examinations are given not before the end of the third year and not later than the end of the fourth year. While a student in the "honors" course in chemistry is examined in nothing but chemistry, in reality the questions involve a knowledge of physics and mathematics and even at times of French and German. So in other "honors" courses. While questions in the chosen branch of study will constitute the chief part of an examination, the student may count upon being asked questions involving a knowledge of other subjects allied to the main one. This is specialization in a marked degree. Yet, as apparent in the examination questions, the work is done on a broad basis. One will find professors of science in the British universities who have an accurate and ready knowledge of the classics; and professors of history or some other

"humanity" with a noteworthy knowledge of some branches of science. "Honors" examinations concentrate not only on a knowledge of the special subject and allied branches, but also upon the mental power to handle intelligently new knowledge with which a student may not have had previous acquaintance. As stated before, examinations in the universities of Great Britain are intelligence tests on a high plane. (The new term in the United States is "scholastic aptitude" tests.)

"Honors" courses are held in high esteem everywhere, and students, if not exactly forced into them, are urged and persuaded into them. In fact the pressure to enter an "honors" course may begin to be exerted in the preparatory school, and even students whom we would designate as of average ability are "helped" by school masters and university tutors to decide upon some "honors" course. There are colleges at Oxford which will not accept "pass" men at all, and in the whole student body of about 5000 undergraduates at that university, there are less than 700 in the "pass" courses. At Cambridge, the "pass" courses have been made somewhat more severe than in former years and a larger number is enrolled in them there than at Oxford. But in the entire enrolment for degrees in fourteen English universities in 1923, 60% were "honors" degrees. In other words, concentration is a basic principle in this British system of education.

As stated in a former article (June (1926) Quarterly), there is a close connection of this solid, wholesome university training with the civilization that is British and with the stability of character which the intelligent Britisher has ever shown, especially in the hour of national stress and crisis. Evidence of this connection is everywhere apparent in Great Britain—in the House of Commons when debates are in progress, in public meetings at the universities presided over and participated in by university officers, in private discussions between individuals, whether the individuals happen to be undergraduates in residence at universities or graduates in business and professional life. In a crisis, the situation is considered exactly as it is, not lightly nor superficially nor hysterically, but seriously, profoundly, judicially. Facts are sought persistently and fearlessly; when found, they are grappled with forcibly and intelligently. The British mind appears at its best in a crisis. In all situations, whether critical or normal, the British power to concentrate is unmistakable. The undergraduate and the educational system and the national character explain each other in Great Britain as they do everywhere else.

IN MEMORIAM

CHARLES MARQUIS SMITH

Charles Marquis Smith was born in Racine, Wisconsin, September 28, 1872, and died at Racine on July 20, 1926, due to injuries received when he fell from a ladder on July 19th.

He was educated at the Racine public schools and at the University of Wisconsin, where he graduated in 1896. He remained there four years as assistant and later as instructor in Physics. For a period of one and one-half years in 1900 and 1901 he studied under Dr. Roentgen in the University of München. In 1901 he came to Purdue as Associate in Physics and was advanced successively to the ranks of Assistant Professor, Associate Professor and Professor of Physics, which position he held at the time of his death.

In 1903, Professor Smith was married to Harriet Louise Goetsch, Wisconsin, 1897, who died in 1922, leaving one son, Edward Baldwin, now a sophomore in Purdue.

Professor Smith was elected to membership in the Purdue Chapter of Sigma Xi on May 11, 1910, and was an earnest and active member of the chapter until the day of his death. He served on the Electoral Board from 1913 to 1915. He held the office of Treasurer from 1923 to 1925 and that of President from 1925 till the time of his death. The Purdue Chapter has lost an efficient leader and a zealous companion.

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